

Bay fill: considerations for bottom habitats in the open bay



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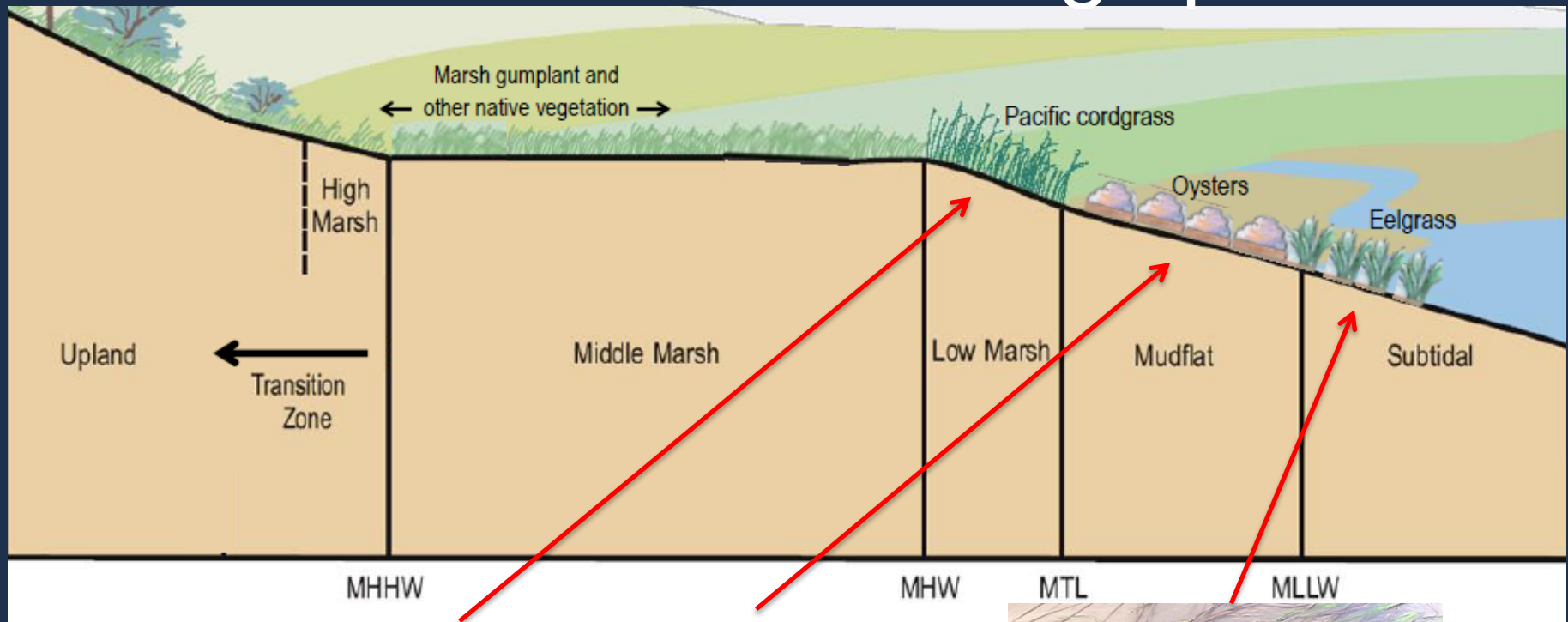


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Possibilities for bay fill with regard to the shallow subtidal regions:

- Restoration of species or habitats without a sea level rise component
- Green infrastructure projects intended to address/adapt to sea level rise

Restoration in the open bay: focus on habitat-forming species



In open bay: mostly native oysters, eelgrass, rockweed

Olympia Oysters: *Ostrea lurida*



S. Kiriakopoulos

Eelgrass: *Zostera marina*



Most of these species-focused restoration projects provide complex structure that attracts many other species.

Fish and invertebrates associated with physical structure increase:

- Juvenile Dungeness Crabs
- Bay Shrimp
- Red Crabs
- CA Rock Crabs
- Bay Pipefish



Black surfperch and bay pipefish:
association with eelgrass

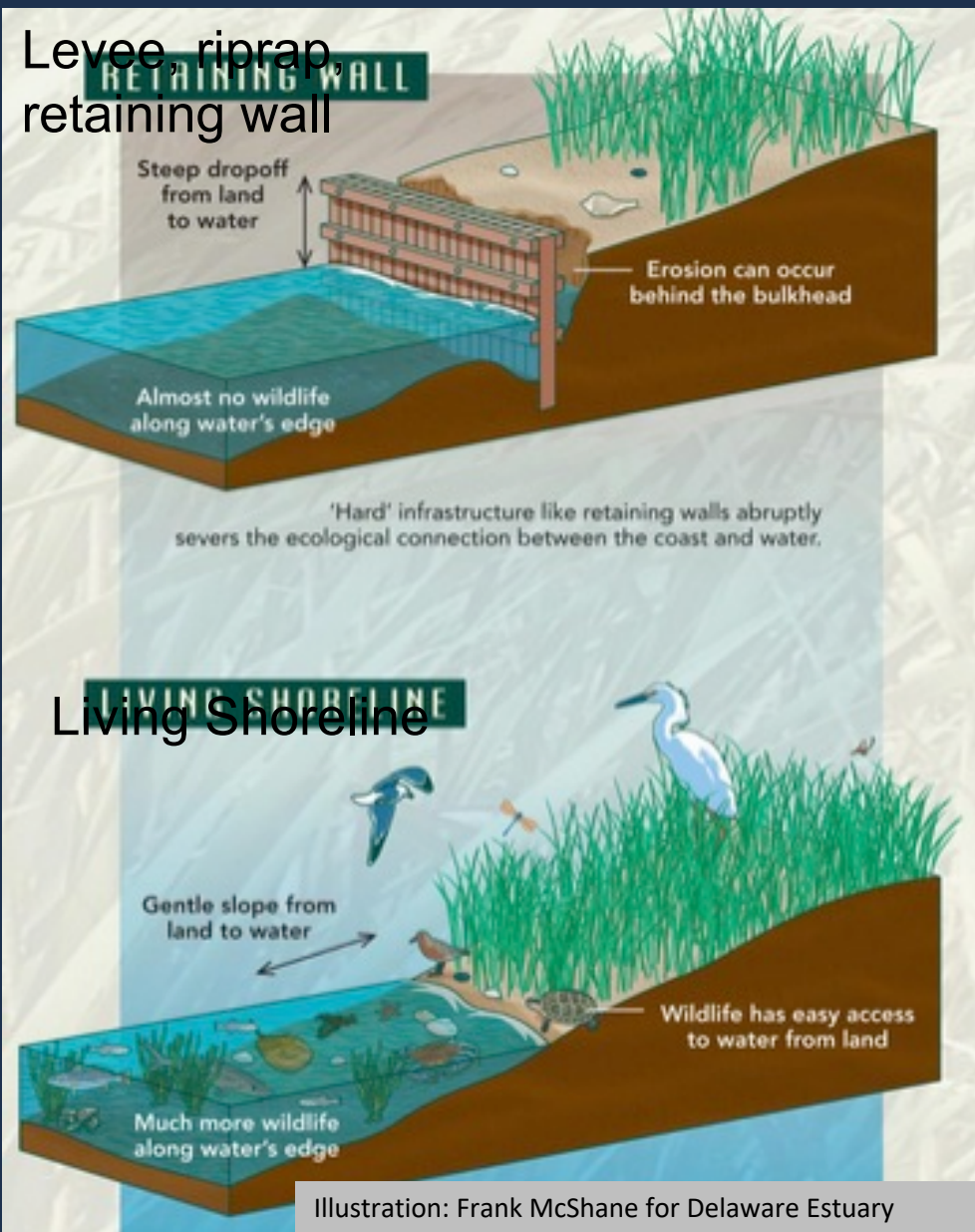
Pacific staghorn sculpin with oyster reef

Living shorelines / green infrastructure or hybrids as an alternative to fully grey infrastructure:

Shoreline protection solutions that bolster habitat values of coastal ecosystems

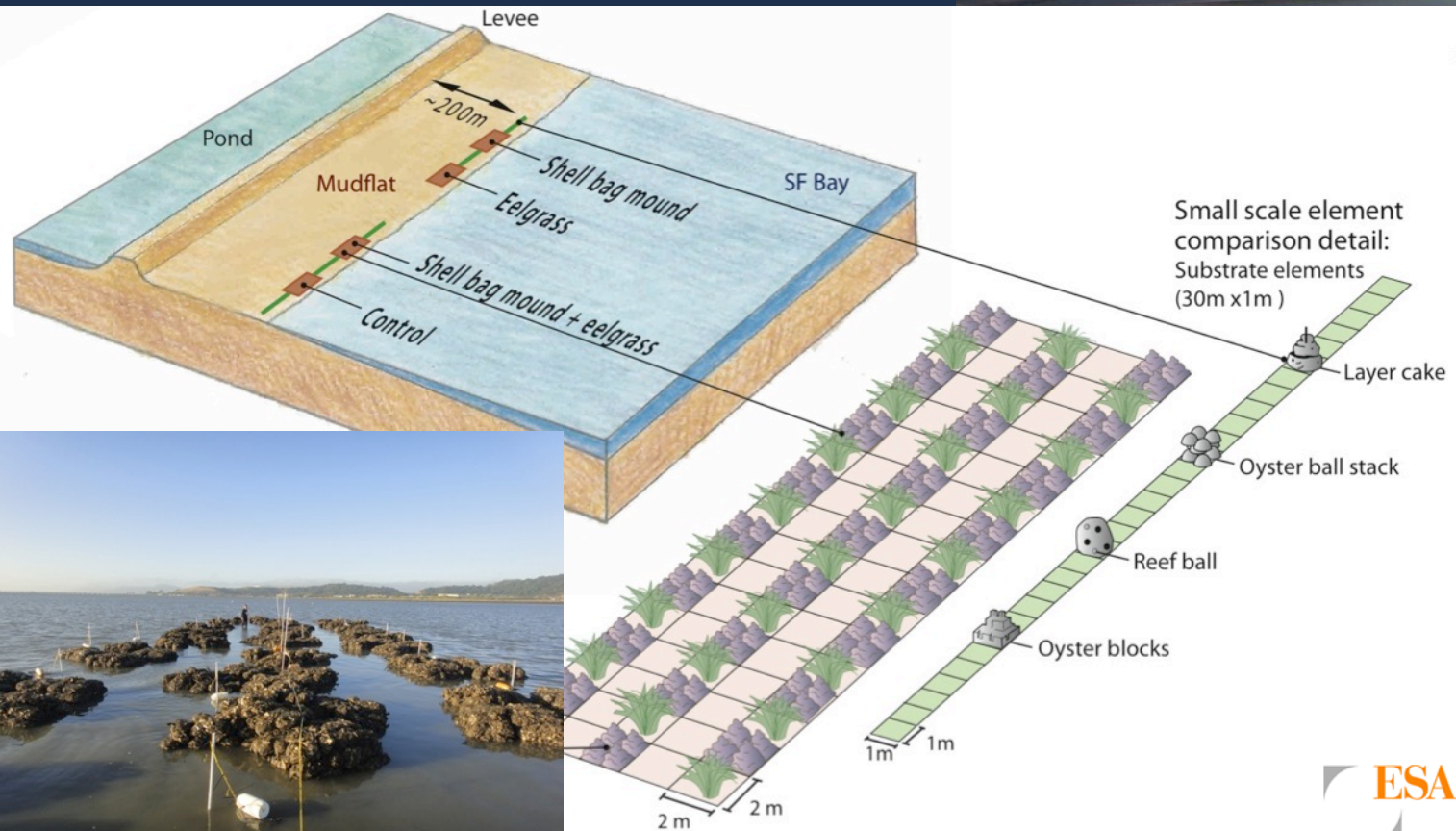
Protect and support vegetated habitats

Link and connect habitats, processes

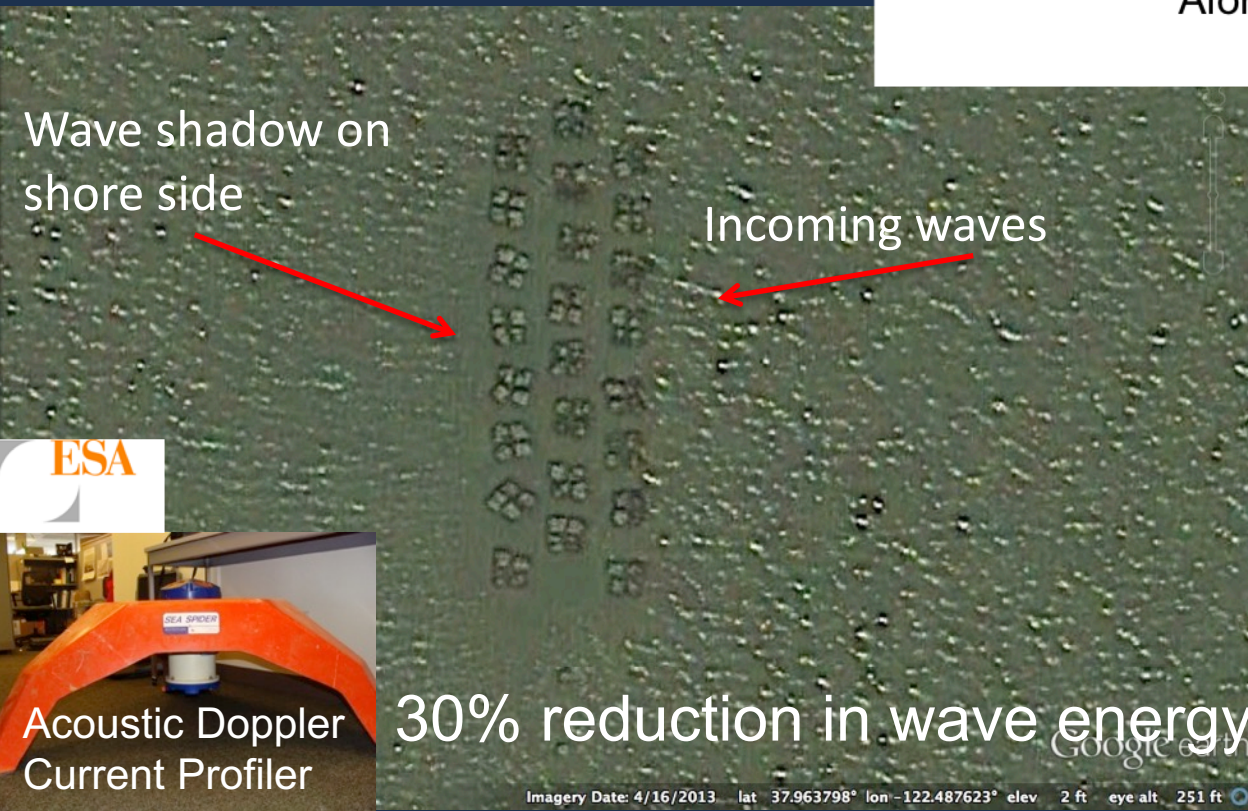
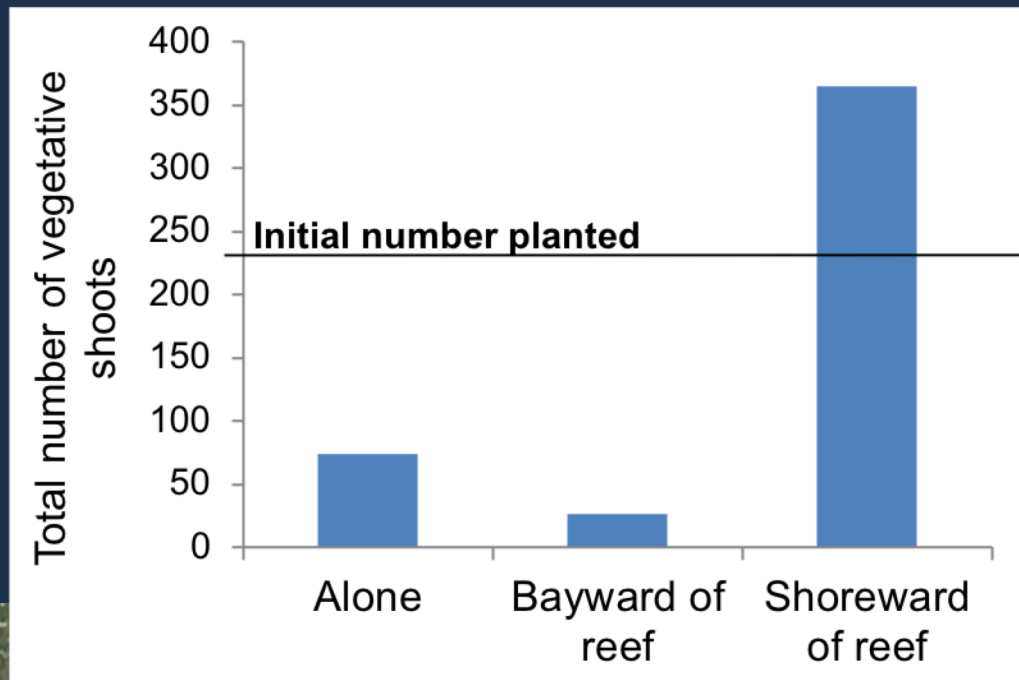


Pilot projects so far....

CA State Coastal Conservancy's Living Shorelines Project in San Rafael:
Restored eelgrass and oyster reefs together versus alone



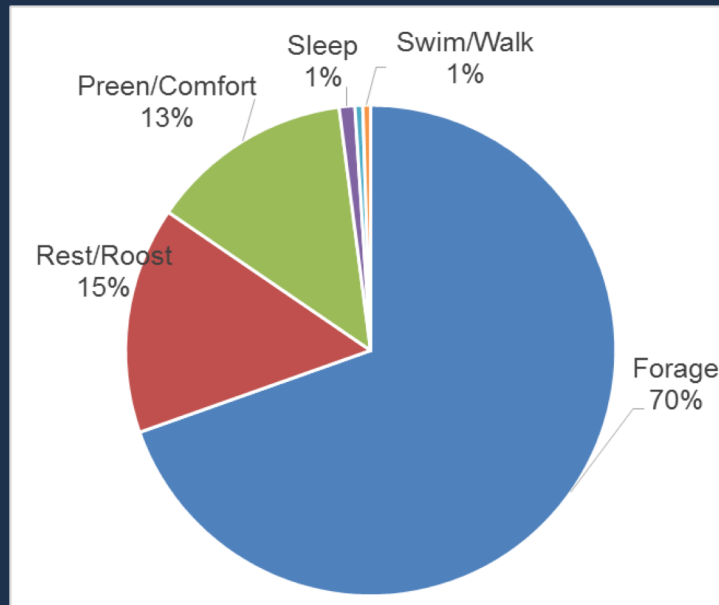
When we start to scale up, potential habitat synergies emerge



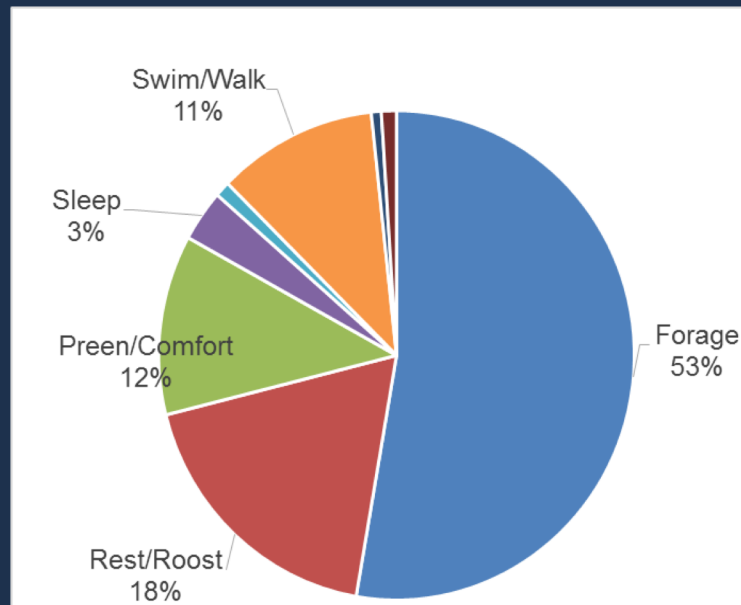
Scaling up can enhance wildlife values

All birds: behavior on or off reefs

On oyster reefs



Off reefs



Increased opportunity for foraging

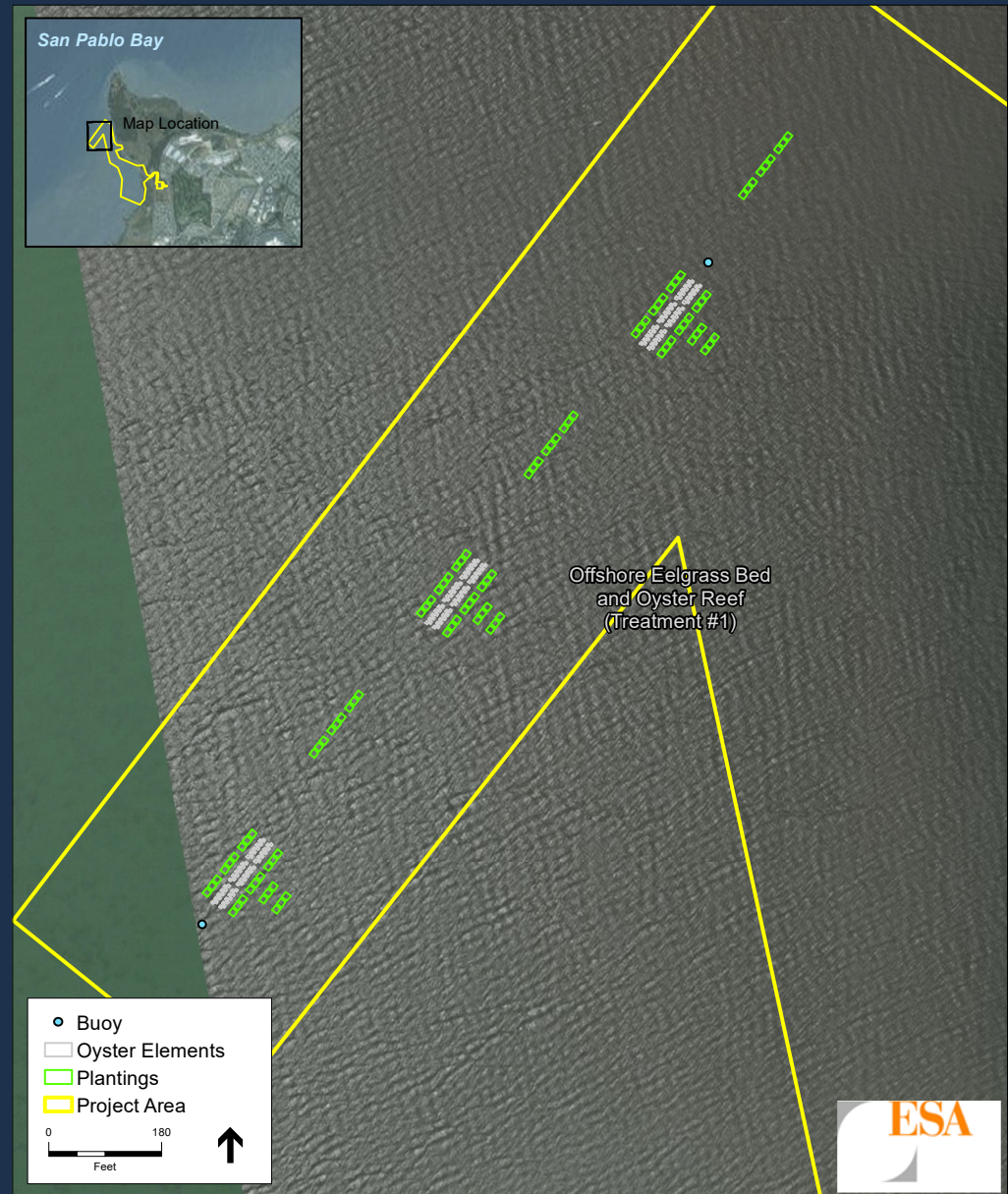
San Rafael project informed Giant Marsh design

Eelgrass shoreward and bayward of oyster reefs

With replication

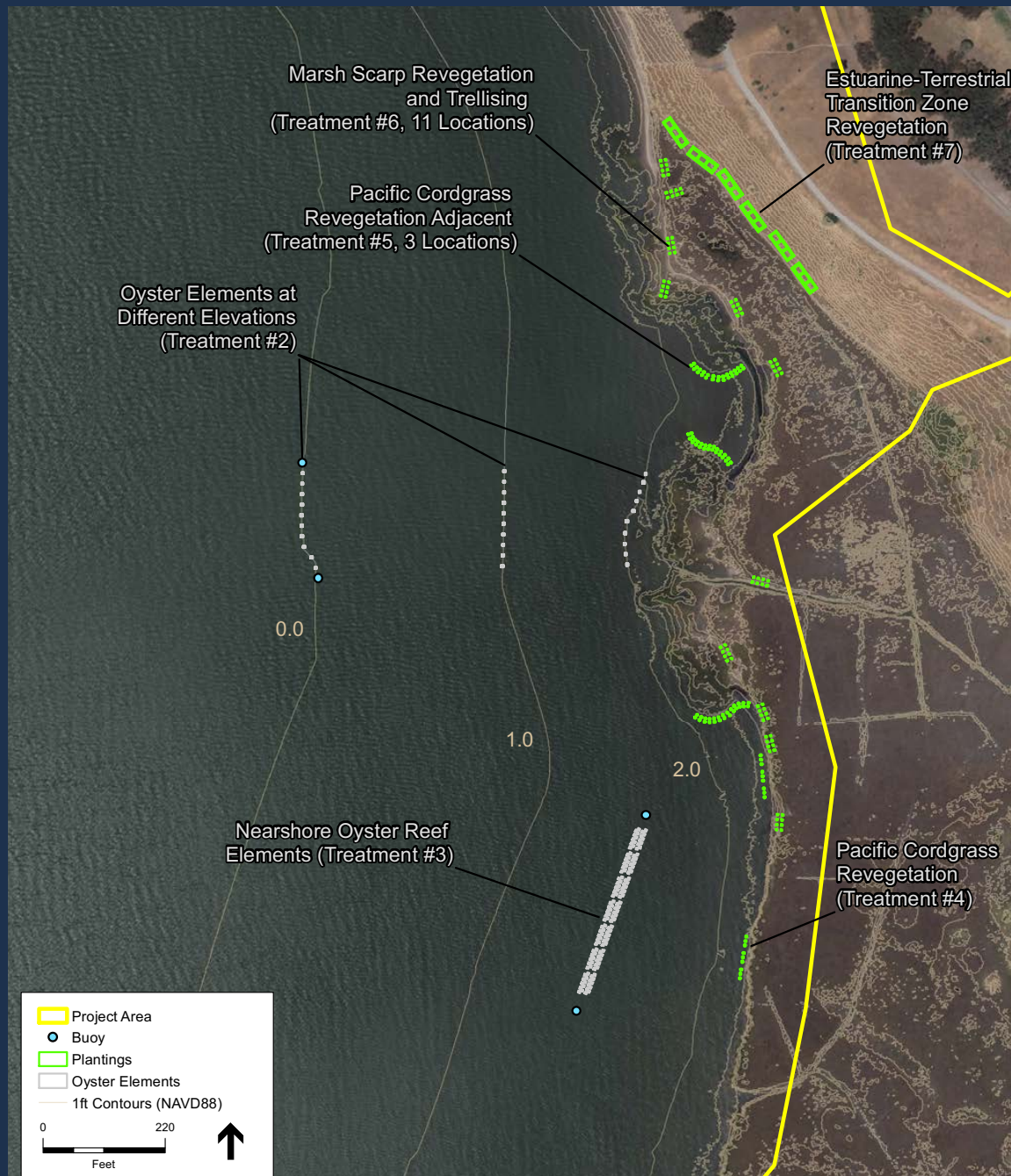
Shell bags on reef ball bases (in limited supply)

Construction 2019



Giant Marsh living shoreline project

A variety of different treatments, set up in an experimental way, to facilitate monitoring and learning



My general thoughts and conclusions about these kinds of bay fill:

They are necessary in order to continue to have their many values present into the future as sea level rises

Generally, there is much in the way of added habitat value, and there is much more mudflat/sandflat

We need to scale up beyond the pilot projects currently in the bay, and fast

We can do this in a careful way, such that existing sensitive habitats are considered, avoided, augmented



Thanks!

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